

**NASA TECH BRIEF***Langley Research Center*

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**Thermally-Stable, Syntactic Pyrrone Foams**

Syntactic foams, prepared from mixtures of BTDA-DAB (benzophenone tetracarboxylic dianhydride diaminobenzidine) resins and hollow carbon microspheres, have been found to have low curing shrinkages and very low coefficients of thermal expansion. These foam formulations may be readily emplaced in honeycomb structures after heating to a soft, doughlike consistency and forcing the heated mixture into the honeycomb cells. Final cure can be accomplished by a simple oven cure, with no need for containment or restriction of the foam formulation during cure.

Syntactic foam formulations are prepared by thoroughly mixing the desired proportions of powdered BTDA-DAB prepolymer and hollow carbon microspheres. The desired formulation is calculated from the true density of the microspheres (determined pycnometrically), the required volume fraction of microspheres, and the desired foam density. The resulting mixture can either be molded in a compression mold or emplaced and cured in a honeycomb structure. The mixture can also be heated in a small cylinder and injected into honeycomb cells by applying moderate pressure.

This is a new class of syntactic foams suitable for high-temperature structural applications to temperatures as high as 316° C (600° F). These foams can be used in combination with metal or fiberglass-reinforced plastic honeycomb to form lightweight structural elements. They can also be used as a local core-fill material in areas where more strength is required, for securing inserts in honeycomb structures, or for splicing one section of honeycomb to another. In addition, the foams should be very useful in applications requiring extreme dimensional stability and good high-temperature resistance.

**Notes:**

1. The following documentation may be obtained from:  
National Technical Information Service  
Springfield, Virginia 22151  
Single document price \$3.00  
(or microfiche \$1.45)

Reference: NASA CR-2222 (N73-18574), Development of Pyrrone Structural Foams for Honeycomb Filler

2. Technical questions may be directed to:  
Technology Utilization Officer  
Langley Research Center  
Mail Stop 139-A  
Hampton, Virginia 23665  
Reference: B74-10135

**Patent status:**

Inquiries concerning rights for the commercial use of this invention should be addressed to:

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